# TM 5-4170

WAR DEPARTMENT TECHNICAL MANUAL

11.5. Across

PRESS, HYDRAULIC,
PORTABLE, HAND-OPERATED,
UNIVERSAL,
WITH TRACK-SERVICING
ATTACHMENTS,
100-TON, RODGERS,
MODELS 22 AND 36

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MAINTENANCE INSTRUCTIONS AND PARTS CATALOG



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WAR DEPARTMENT • 20 FEBRUARY 1945



#### WAR DEPARTMENT

Washington 25, D. C., 20 February 1945

TM 5-4170 Press, Hydraulic, Portable, Hand-Operated, Universal, With Track-Servicing Attachments, 100-Ton, Rodgers, Models 22 and 36, is published for the information and guidance of all concerned.

A. G. 300.7 11 August 1944

BY ORDER OF THE SECRETARY OF WAR:

G. C. MARSHALL, Chief of Staff.

#### **OFFICIAL:**

J. A. ULIO,

Major General,

The Adjutant General

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#### **GENERAL DESCRIPTION**

(See Figures 1 and 2.)

The Rodgers Model 22-100 Ton Universal Press and the Rodgers Model 36-100 Ton Universal Press are identical except for the size of the Press Frames. The Model 22 denoting 22" working space within the Press Frame and the Model 36 denoting 36" working space within the Press Frame.

Each model consists of a 4-Speed Hand Pump, 100 Ton Press Cylinder (6½ inch Ram Travel) with a Service Tool Head for Caterpillar Tools, 100 Ton Press Frame and Track Servicing Attachment.

The 4-Speed Hand Pump, Press Cylinder and Press Frame is designed for use as a general shop press or it may be mounted on a truck or carried loose to be used as a portable unit for straightening or bending shafting, structural steel and axles, or it may be used to remove or replace gears, pulleys and sprockets (Figure 1).

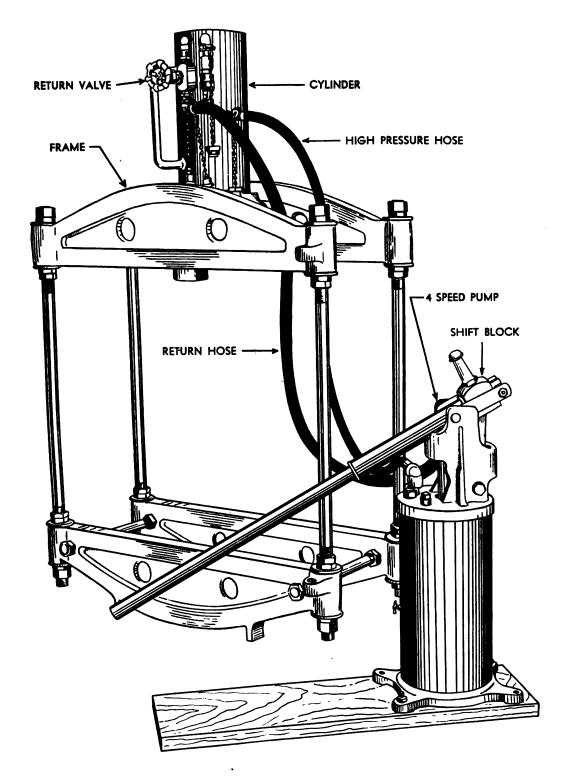
The Track Servicing Attachment when used in conjunction with the Press Cylinder and Pump can be used to remove and replace pins and bushings in all types of tractor crawler tracks (Figure 2).

		Inc.
	IEAPOLIS, MINN.	<b>—</b> C
SERIAL NO.		
	MODEL NO.	

WARNING

MAX. RAM TRAVEL INCHES C

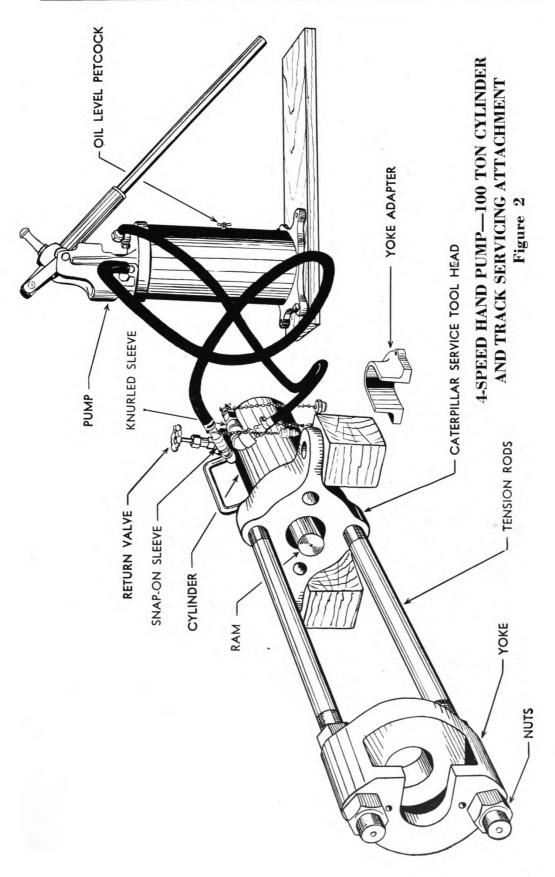
DO NOT EXCEED



## 4-SPEED HAND PUMP—100 TON CYLINDER AND UNIVERSAL FRAME

Figure 1





#### **DETAILED DESCRIPTION**

Both Rodgers Model 22 and Model 36-100 Ton Universal Press consists of the following major components, assemblies and accessories.

#### PUMP-

Make—Rodgers Hydraulic Inc.

Type—Hydraulic—Hand operated—4-Speed.

Capacity—10,000 p.s.i.

Connections—2 Hoses fitted with "quick couplers."

#### FRAME-

Upper and Lower frame members cast alloy steel. Main Tension Rods, alloy steel. Distance between rods, center to center 22 inches on the Model 22 and 36 inches on the Model 36.

#### CYLINDER-

6½ inch Ram Travel—Capacity 100 Tons.

#### CATERPILLAR SERVICE TOOL HEAD-

Screwed on end of Cylinder at all times unless used for special work.

#### TRACK SERVICING ATTACHMENT—

Consists of 2 Tension rods and nuts, yoke and yoke adapter used to perform work on both large and small type crawler tracks.

#### TRACK TOOLS AND RAM CAPS-

Used to perform work on all types of crawler tracks with Track Servicing Attachment.

## OPERATING SECTION





#### **OPERATING PRECAUTIONS**

- 1. DO NOT operate pump with oil above level of pet cock.
- 2. DO NOT fail to use clean oil at all times.
- 3. DO NOT fail to remove air from hose and cylinder after equipment has been idle for a period of time.
- 4. DO NOT forget to replace Closures on hose couplers when equipment is not in use.
- 5. DO NOT neglect to keep Caterpillar Service Tool Head screwed on cylinder unless cylinder is to be used for special purposes—then replace Head to protect threads on cylinder.
- 6. DO NOT operate Track Servicing Attachment unless work to be done is blocked level and in line with ram.
- 7. DO NOT run ram out farther than  $6\frac{1}{2}$  inches actual travel.
- 8. DO NOT expect to make long pushes with one set up of ram caps and pins—return ram after moderate push and add additional ram cap.
- 9. DO NOT use ram directly against work unless protected by use of ram cap.
- 10. DO NOT use Frame unless Upper and Lower frame members are evenly spaced.
- 11. DO NOT forget to block work to be done in frame as close as possible to ram.



#### SERVICING PUMP FOR FIRST TIME

(Figure 1)

If equipment is to be used in a permanent location then bolt pump to floor or some convenient rigid surface. If, however, the equipment is to be used in the field or as a portable unit then bolt pump to a piece of plank 2x10x30 inches, locating pump at one end of plank so that other end of plank will extend back to about the length of pump handle. Too short or narrow plank will not permit full power of pump to be developed. (Figures 1 and 2.)

Insert threaded end of pump handle into short machined quill or handle of pump proper and screw in as far as it will go.

The pump is connected to cylinder by means of 2 hoses. Connect the return hose ( $\frac{1}{2}$  inch hose) to the blind nipple next to handle support on pump and fasten to return valve connection on cylinder by means of snap-on sleeve. Then connect the high pressure hose ( $\frac{1}{4}$  inch hose) by screwing into street ell on top plate of pump and fasten other end of hose to cylinder by screwing knurled sleeve over connection by hand. Do not use wrench to tighten but turn up tight by hand only.

#### FILLING PUMP

(Figures 1, 2 and 17)

After pump is connected to cylinder, fill pump through oil fill plug, located in flat cover below pump handle. Fill with oil to level of pet cock on side of pump. See Lubrication Order, for proper grade of Oil to use.

Then close return valve on cylinder and operate pump until ram of cylinder extends out  $6\frac{1}{2}$  inches actual travel. If ram does not travel  $6\frac{1}{2}$  inches, add more oil to pump. Then open return valve on cylinder and allow the ram to return to its normal starting position, now open oil level pet cock on side of pump and allow excess oil to drain out to level of pet cock. If, however, oil does not drain from pet cock add additional oil to pump until it does drain out at level of pet cock. (CAUTION: Do not at any time allow ram of cylinder to extend out more than  $6\frac{1}{2}$  inches actual travel.)



#### WAR DEPARTMENT LUBRICATION ORDER LOS-4170

15 MAR. 1945

## PRESS, HYDRAULIC, PORTABLE, HAND-OPERATED, UNIVERSAL, WITH TRACK-SERVICING ATTACHMENTS, 100-TON, RODGERS, MODELS 22 and 36

**OE 10** 

REFERENCE TM5-4170 PUMP SERIAL NO. LOCATED ON HEAD UNDER HANDLE.

CYLINDER SERIAL NO. LOCATED ON SIDE OF CYLINDER IN FRONT OF GLOBE VALVE.

	KEI		
LUBRICANTS	LOWEST EX	EXPECTED AIR TEMPERATURE	
OE — OIL, Engine	Above +32°F.	+32° F. to 0°F.	Below O°F.
Hydraulic Pump	OE 30	OE 10	ОН

OIL LEVEL

M — Monthly S — Semi-

**OE 10** 

OH — OIL, Hydraulic.

OF 30

annually

INTERVALS W - Weekly

Interval Lubricant OE Hydraulic Pump S Fill and Drain Plug (See Key) (Drain and Refill) Shift Block Pin OF --M OE **Shift Block** Linkage OE M Hydraulic Pump Level (Check Level)

> To drain oil from pump, tip pump to allow oil to run out of fill plug in head.

> To refill, pour oil into pump, through fill plug in head, until oil reaches level of pet cock. The danger of running ram out too far is minimized if oil is not allowed to go above level of pet cock.

Copy of this Lubrication Order will remain with the equipment at all times; instructions contained therein are mandatory and supersede all conflicting lubrication instructions dated prior to 15 Mar. 1945.

By order of the Secretary of War.

G. C. MARSHALL, Chief of Staff. (A. G. 300.8 (15 Mar. 1945)

The Adjutant General.

OFFICIAL:
J. A. ULIO,
Major General,

REQUISITION NECESSARY ADDITIONAL LUBRICATION ORDERS IN CONFORMANCE WITH INSTRUCTIONS AND LISTS IN FM21-6

NOTES I. FITTINGS — Clean before applying the lubricant.

Other Points

- CLEANING SOLVENT, drycleaning or OIL, fuel, diesel will be used to clean, or wash all parts. Use of gasoline for this purpose is prohibited. All parts will be thoroughly dry before relubrication.
- HÓURS Intervals indicated are for normal service. For extreme conditions of heat, mud, water, snow and dust change pump reservoir oil and lubricate more frequently.
- Lubricate dotted arrow points on both sides.

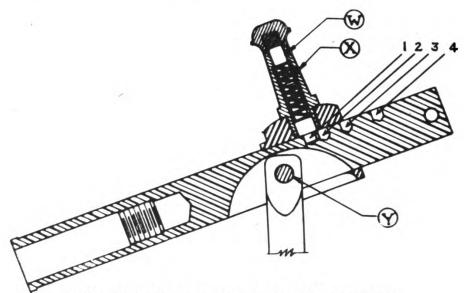


#### **OPERATING PUMP**

(Figures 1, 2, 3, 4 and 5)

The pump has four speeds. The four speeds will produce pressures ranging from about 20 tons in "HIGH" speed to a full 100 tons in "LOW" speed position. Use the high speeds to take up slack or for light jobs, shifting into lower speed when more pressure is required. If pressure is built up too high so the handle cannot be pushed down to a convenient shifting position, release return valve on cylinder to drop pressure slightly. The shift mechanism consists of a shift block which slides on "QUILL" section of pump handle: to shift speeds have pump handle in about level position—hold the handle on shift block against the palm of left hand with three fingers, using the index finger and thumb to lift lock pin knob on top of shift handle. (Figure 3, 4 and 5.)

Push the shift block away from you to extreme end position on slide for highest speed. Pull shift block toward pump handle to other extreme for lowest speed and greatest pressures. When knob is released, plunger in shift block will lock in one of the four holes in quill. A little practice will make shifting speeds easy. Keep the shift mechanism and top wrist pin of connecting rod well oiled. Figure 4 shows shift in "HIGH" speed. Figure 5 shows shift in "LOW" speed for greatest power.



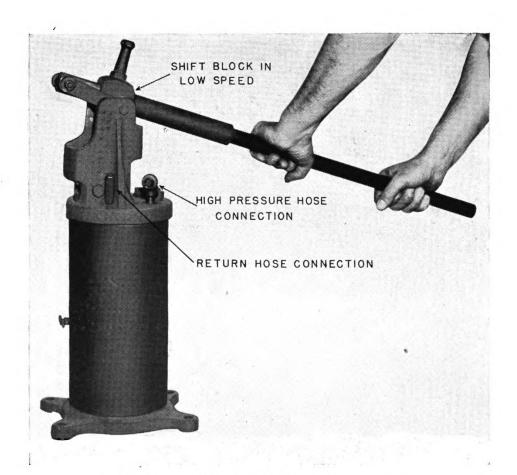
CROSS SECTION OF PUMP SHIFT LOCK
ARROWS MARKED 1 LOW, 2 AND 3 INTERMEDIATE,
4 HIGH SPEED

Figure 3



SHIFTING PUMP INTO HIGH SPEED Figure 4





METHOD OF PUMPING—LOW SPEED Figure 5

#### **OPERATION OF RAM**

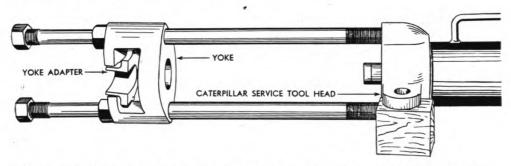
(Figures 1 and 2)

To operate ram, close the return valve on press cylinder. With pump shift set for desired speed, pump ram out as required. The ram has a safe travel of  $6\frac{1}{2}$  inches (actual). DO NOT EXCEED. To return the ram, open valve on cylinder. When press has just been put into use or has stood idle for a period of time, the ram should be run out an inch or two and returned several times to eliminate air in the hose and cylinder.

#### PURPOSE OF SERVICE TOOL HEAD

The Service Tool Head is attached with right hand threads to end of press cylinder and should be left on cylinder unless special jobs require its removal. If the head is removed be sure threads are clean and oiled before replacing head on cylinder.

THE SERVICE TOOL HEAD is used to attach cylinder to TRACK ATTACHMENT and to UNIVERSAL FRAME as well as being used as an adapter for all tools provided by the Caterpillar Tractor Company for use with their portable hydraulic press listed in technical manuals TM5-3068, TM5-3110, TM5-3040, TM5-1018 and TM5-3100.



## TRACK SERVICING UNIT IN POSITION FOR WORKING SMALL TRACKS WITH SERVICE TOOL HEAD

Figure 6

#### **HOW TO USE UNIVERSAL PRESS FRAME**

(Figures 1 and 30)

Place the Service Tool Head with press cylinder attached between Top Frame Member U-501-2 (Figure 30) and fasten in place with two 1½ inch Anchor Bolts U-501-1. These anchor bolts are inserted in the holes provided in top frame member and screwed into threaded holes in Service Tool Head. Be sure both bolts are drawn up tight.

The Universal Press is now ready for use as a general shop press for any work within its capacity such as straightening or bending shafting, structural steel, axles, or removing or replacing gears, sprockets. The track tools and ram caps are of heat-treated alloy steel and will be found useful in performing many of these jobs.

The Universal Press may be used in any position or it may be dismantled and reassembled about a gear to be pulled, a frame to be straightened, or similar work which cannot be readily brought to the press. The Lower Frame Members U-502-2, are spaced by two Tie Rods U-506, which may be used to adjust distance between rails when needed for special jobs. (Figure 30.)



It is advisable to keep lower frame members spaced about the same distance apart as the top frame member unless needed for special jobs. Be sure four main tension rods U-504-1, (figures 1 and 30) are adjusted to space the distance between top frame member and lower frame member uniformally.

(CAUTION: Keep work to be done, blocked as close as possible to ram.)

#### HOW TO USE SERVICING ATTACHMENT

(Figures 2, 6 and 29)

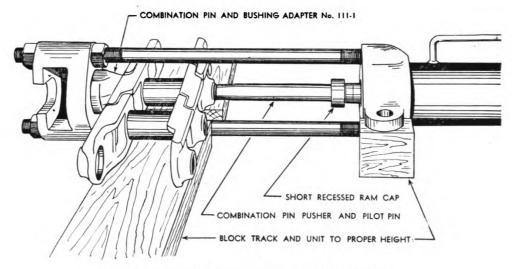
The Track Servicing Attachment (figures 2, 6 and 29) consists of a yoke, yoke adapter, and two tension rods with nuts. The tension rods are threaded on one end to be screwed into tapped holes in Service Tool Head on end of press cylinder. The other end of tension rods have two threaded sections—the inner threaded section is used in set up for working small tracks (figure 6) and the outer threaded section is used in set up for working large tracks (figure 2). For working small tracks pass rods through the holes in either end of the yoke with the nuts of the rods against the side of the yoke having horseshoe-shaped opening. Then screw rods into holes of Service Tool Head. For working large tracks remove the nuts at the ends of the tension rods—screw rods into Service Tool Head and fit yoke over other end of tension rods. Have round hole in yoke facing toward press cylinder in all cases (shown best in figures 6, 8 and 9.) Then replace nuts on ends of tension rods and adjust to hold yoke square with line of pressure.

In all track work have the ram in returned position and build up a ram cap assembly as long as necessary to perform the work (figures 8 and 10). If the operation requires a longer push, return ram of press after pushing the limit of ram travel ( $6\frac{1}{2}$  inches) and insert an extension of ram cap to complete the push.

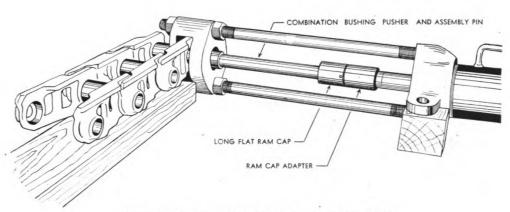
If more than one or two links of track must be serviced provide a board or plank blocked to proper height to hold tracks so pins and bushings will be in line with ram of press.



•



SET UP FOR REPLACING PINS Figure 7



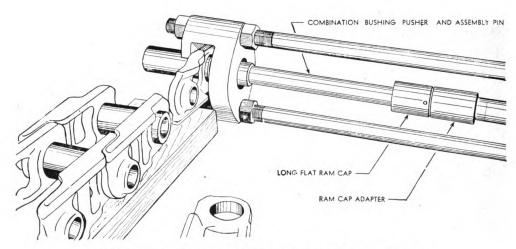
SET UP TO REMOVE BUSHINGS Figure 8



#### HOW TO REMOVE AND REPLACE TRACK PINS

To remove track pins place press cylinder with track attachment on floor or ground. Block up under flanges of Service Tool Head to hold press in place with tension rods directly above one another. Place pin and bushing adapter combination against yoke with hub of adapter in hole of yoke. Place track rail against this adapter with boss of rail inserted in cupshaped recess in adapter. Use ram caps on ram as previously described, place pin pusher between end of track pin and ram cap on ram and press pin out. If pin is long enough to require more than  $6\frac{1}{2}$  inches travel, return ram after that travel is reached and insert an extension of the ram cap.

To replace pins use the same adapter and press the pin in, using the ram cap on the end of pin and extension ram caps as needed (figure 7). Pass the combination pin pusher and pilot pin through the track ahead of the pin to be pressed in, to help hold rails in alignment.



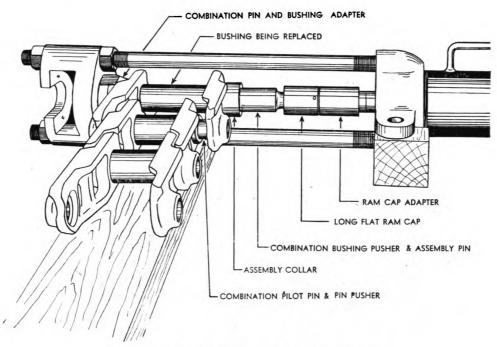
BUSHING BEING REMOVED FROM RAIL Figure 9

#### **HOW TO REMOVE AND REPLACE TRACK BUSHINGS**

To remove bushings place the bushing to be removed in the horseshoe-shaped opening in yoke with one rail in front and one behind this section of yoke (figure 8). One end of bushing pusher and assembly pin is machined to fit in hole in bushing and bear against end of bushing. Pass this end of tool through round hole of yoke and insert in and against bushing. Have the other end of tool against ram of press and force bushing from rail. Turn bushing end for end and force bushing from second rail (figure 9).

## ALWAYS BE SURE PIN IN OTHER END OF RAIL FROM WHICH BUSHING IS BEING PRESSED HAS ALSO BEEN REMOVED





## PRESSING RAILS ONTO BUSHING Figure 10

Because of the small diameter of bushings used in smaller tracks a yoke adapter 3488-1 BRH, (figures 6 and 29) is provided to be used in servicing D4 and other small tracks. The yoke adapter fits into horseshoe opening in yoke, and is held in place by two capscrews passed through holes in back of yoke and screwed into yoke adapter.

To replace bushings use bushing pusher and assembly pin combination tool with assembly collar on long straight portion of tool. Pass assembly pin through one rail, then through the bushing, through the second rail to be assembled, and through hole in assembly combination adapter. Place this assembly in press with adapter against yoke as in pressing pins and force both rails onto bushing (figure 10).

The recesses in collar and adapter will properly space rails on bushings. Always turn pins and bushings 180° (½ revolution) when replacing to insure a new full surface on bushing against sprocket and between track pin and bushing. As soon as bushing is started into rail "EYES" be sure rails being assembled are in alignment to interlock with balance of track already assembled. The pilot pin may be inserted in pin end of rail being assembled and through bushing of track already assembled to insure proper interlocking of links. Use only the tools specified for working that size track. (See tools listed in figures 11, 12, 13 and 14.)



#### TRACK TOOLS- & RAM CAPS



SHORT FLAT RAM CAP



1102 SHORT RECESSED RAM CAP



LONG FLAT RAM CAP



1105
RAM CAPADAPTER(LONG)



1105 - I RAM CAP ADAPTER (EXTRA LONG)

Figure 11
TRACK TOOLS AND RAM CAPS

D4 TRACK TOOLS



105-1 PIN ADAPTER & BUSHING ADAPTER



305-1 ASSEMBLY COLLAR



603-1 BUSHING PUSHER & ASSEMBLY PIN



403-1 PIN PUSHER & PILOT PIN

Figure 12 D 4 TRACK TOOLS



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#### D7 TRACK TOOLS



PIN ADAPTER & BUSHING ADAPTER ASSEMBLY COLLAR





606-1

BUSHING PUSHER & ASSEMBLY PIN



406-1

PIN PUSHER & PILOT PIN

Figure 13 D 7 TRACK TOOLS

D8 TRACK TOOLS



113-1

PIN ADAPTER & BUSHING ADAPTER ASSEMBLY COLLAR



313-1



606-1

BUSHING PUSHER & ASSEMBLY PIN



406-1 PIN PUSHER & PILOT PIN

Figure 14

D 8 TRACK TOOLS

17

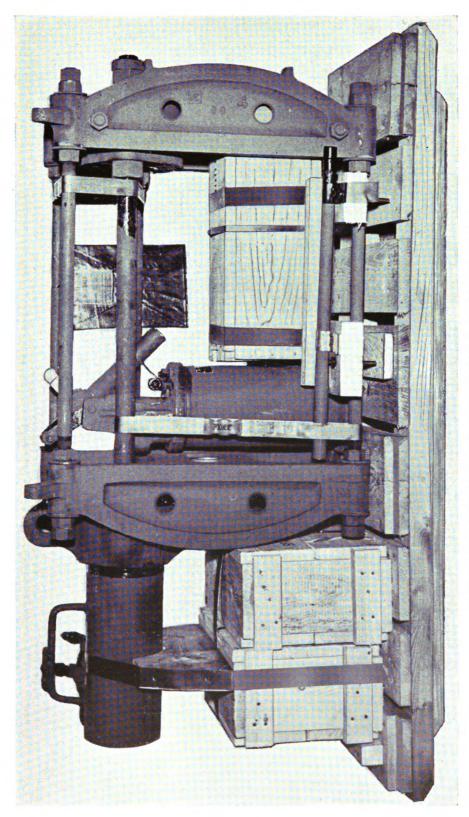
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#### TROUBLE CHART

If the pump and cylinder should fail to function properly the failure may be caused by—

- 1. DIRTY OIL in the pump and cylinder will tend to clog the check valve or return valve. Drain the oil from the system and refill, following instructions on Lubrication Order.
- RETURN VALVE NOT SEATING PROPERLY will not maintain pressure required. The simplest method to check for this condition is to first remove the return hose from the pump and apply pressure to cylinder by several strokes of pump. When return valve is closed and oil still runs from return hose it would indicate that some foreign matter has apparently lodged in return valve and will not allow valve to seat. Return valve should then be removed from line and thoroughly cleaned with petroleum solvent.
- 3. LEAKING OIL AROUND RAM OF CYLINDER would indicate a damaged cylinder leather. Disassemble cylinder and replace with new leather on piston.
- WHEN PRESSURE CANNOT BE HELD AND RETURN VALVE 4. IS SEATING PROPERLY. This condition would then indicate the check valve in pump is not seating properly and should be disassembled and cleaned. In all cases when foreign matter in the oil is the cause of failure to operate properly either strain the oil or replace with fresh oil.
- WHEN PRESSURE CANNOT BE OBTAINED this condition would indicate one of two defects; either the intake valve at the bottom of pump is stuck and should be cleaned or the knurled sleeve coupling on the high pressure hose has not been turned up tight to connection on cylinder. This connection has in it, a valve which will not operate unless both parts of coupling are pulled firmly together. This connection may sometimes become defective and should be replaced if it fails to function. Do not use a wrench to tighten but turn up tight by hand only.
- WHEN RAM FAILS TO RETURN INTO CYLINDER after return valve has been opened would indicate that the ram at some time had been run out too far and the springs in cylinder had either been broken or compressed so tight that not enough expansion was obtainable. cylinder and replace defective springs.



RODGERS MODEL 22, THE DOWN FOR EXPORT Figure 15

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#### SHIPMENT AND STORAGE

#### LIMITED STORAGE

Equipment prepared for temporary storage. Drain oil from pump. Clean exterior of pump and cylinder with solvent dry cleaning and fog with medium coat of AXS-934.

#### **DEAD STORAGE**

Drain oil from pump. Clean exterior of pump and cylinder with petroleum solvent. Cover opening around pump piston and nipple for return hose with wax paper and seal with wax. Place closures on hose connections. Cover ram on cylinder with wax paper and seal with wax. Fog entire exterior of equipment with heavy coat AXS-934.

#### **EXPORT SHIPMENT**

"EXPORT SHIPMENT" reference will be made to TM5-9711, Instructions for Preparation of Corps of Engineer Equipment for Export.

#### SHIPPING DATA

(Figure 15) shows arrangement of components of Rodgers 100 Ton, 22 inch Universal Press packed for export. The only part disassembled from the equipment is the handle of the 4-Speed Pump, which is strapped to the base alongside the Universal Frame.

Net Weight of Equipment	575 Lbs.
Net Weight of Box	250 "
Gross Weight	825 "
Outside Length of Box	4′ 10″
Outside Height of Box	2' 8½"
Outside Width of Box	1' 9¼"
Cubic Feet	<b>2</b> 3

(Figure 16) shows arrangement of the Rodgers 100 Ton, 36 inch Universal Press packed for export. The only part disassembled from the equipment is the handle of the 4-Speed Pump, which is strapped to the base alongside the Universal Frame.

Net Weight of Equipment	670	Lbs.
Net Weight of Box	335	"
Gross Weight	,005	"
Outside Length of Box4	<b>'</b> 10	"
Outside Height of Box	<b>'</b> 10	1/2"
Outside Width of Box1	′ 9	1/4"
Cubic Feet	3	, _





RODGERS MODEL 36, TIE DOWN FOR EXPORT Figure 16

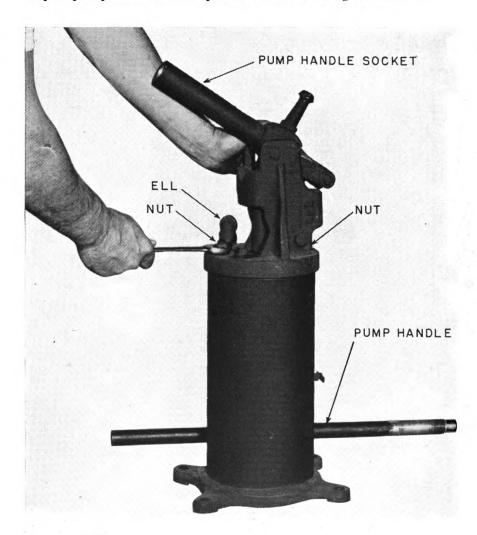
### MAINTENANCE SECTION



#### DISASSEMBLY OF 4-SPEED HAND PUMP

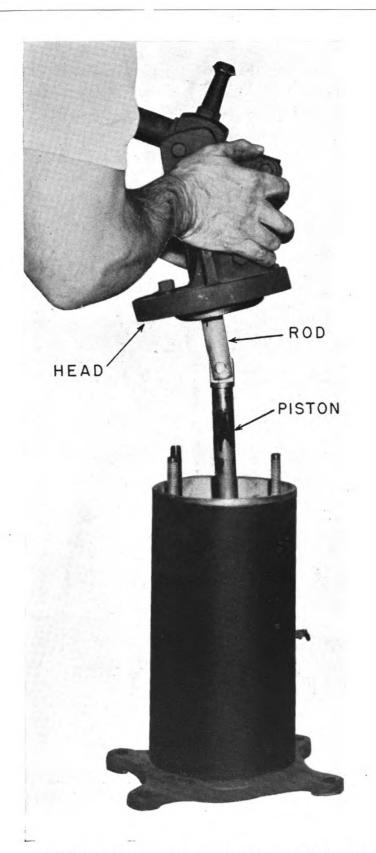
#### GENERAL PROCEDURE

1. Remove the pump handle from the pump handle socket by unscrewing by hand. Next, turn off the pipe ell from the nipple protruding through top of pump head by using pipe wrench and then remove the two nuts from top of pump head with an open end wrench. (Figure 18.)



## REMOVING ELL AND NUTS FROM PUMP HEAD Figure 18

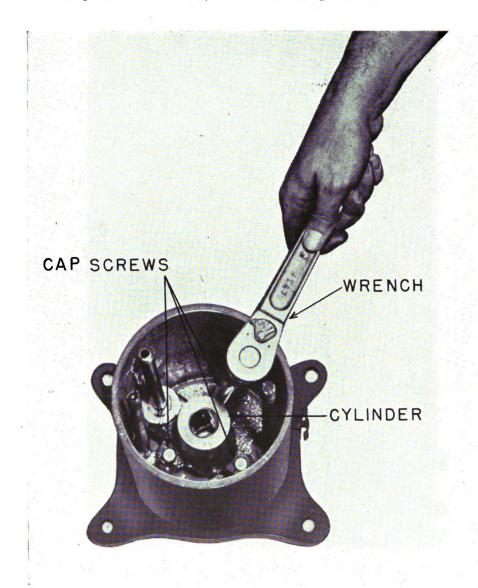
2. Grasp the pump head casting with both hands and lift up removing the rod and piston from the cylinder of pump. (Figure 19.)



REMOVING HEAD AND PISTON ASSEMBLY
Figure 19

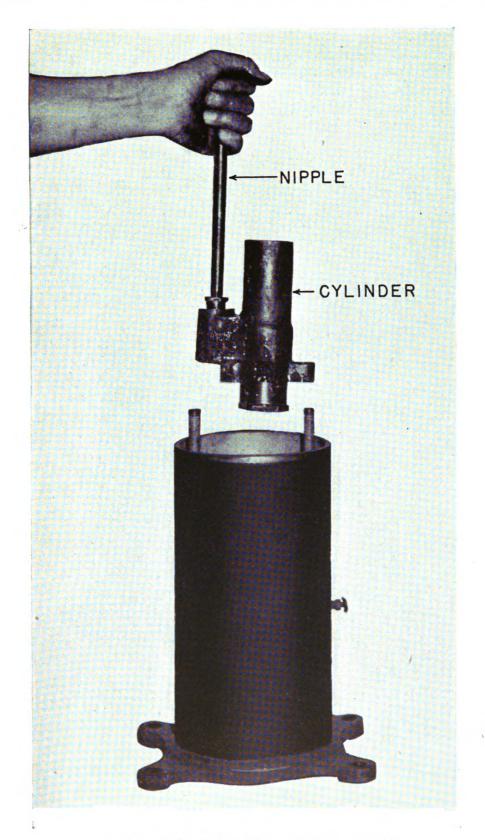


- 3. Wipe off the oil from the piston with a clean rag and then pour the oil from the inside of the pump by tipping the pump body to allow oil to run off into a can or container.
- 4. By using a socket wrench with a long extension unscrew and remove the three cap screws from the cylinder base. (Figure 20.)



## REMOVING CYLINDER BOLTS FROM PUMP Figure 20

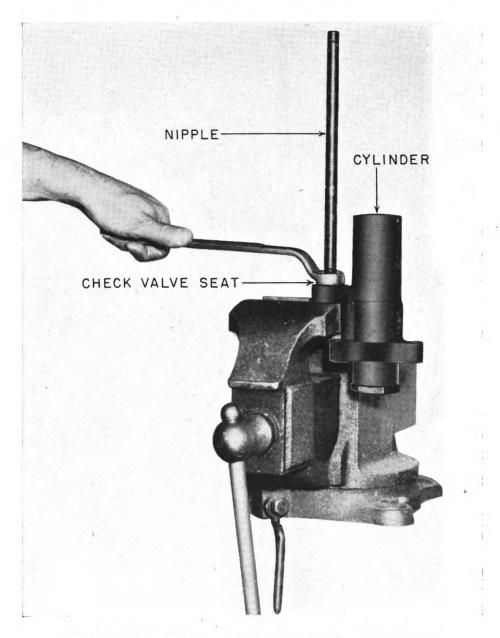
5. Then grasp the long nipple and lift the cylinder from the inside of the pump body. (Figure 21.)



REMOVING CYLINDER FROM PUMP Figure 21

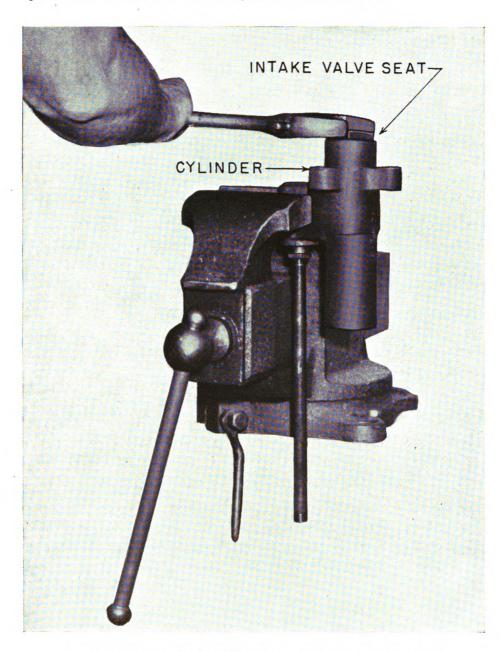


6. Clamp the cylinder in a vise with cylinder opening up and the long nipple up. Then with either a box end wrench or open end wrench unscrew check valve seat. It is not necessary to remove the nipple from the check valve seat before removing the seat from the cylinder. (Figure 22.)



REMOVING CHECK VALVE FROM CYLINDER
Figure 22

- 7. Unclamp the cylinder and invert to shake the steel ball out. Now clamp the cylinder, in an inverted position, in the vise and by using an open end wrench unscrew the intake valve seat. (Figure 23.)
- 8. Remove the steel ball from inside intake valve and clean thoroughly, with petroleum solvent, the inside of cylinder and valve seats.



REMOVING INTAKE VALVE FROM CYLINDER
Figure 23



#### **REASSEMBLY OF 4-SPEED HAND PUMP**

- 1. After all parts of pump have been cleaned carefully with solvent dry cleaning it may then be reassembled.
- 2. Insert 7/8" ball into intake valve seat. Tap ball several times with soft bar stock and hammer until a visible ring is shown from ball on intake valve seat.
- 3. Clamp the cylinder in a vise in an inverted position with intake valve up and insert \( \frac{7}{8}'' \) ball into intake seat of cylinder. After ball has been inserted hold in place by intake valve seat screwed up tight (there is no adjustment for the intake valve other than when assembled by the manufacturer).
- 4. Now, turn the cylinder in vise and insert  $\frac{5}{8}$ " ball into the check valve and seat the ball by tapping as in assembly of intake valve. Hold ball in place by screwing in the ball stop. The ball stop should be pulled up tight enough to allow ball a clearance of  $\frac{1}{16}$ ".
- 5. When intake and check valves are adjusted in cylinder, insert cylinder into pump body and secure in place with three cap screws pulled up tight.

  Screw the long nipple into check valve stop, do not use a sealer on threads—pull up tight.
- 6. Wipe the steel piston of the top assembly clean and then coat the piston with a film of oil and slip the piston into the cylinder. The head casting should then slip over the two pump body rods and over the long nipple. Screw on the two nuts with lock washers over rods, also turn the ell onto the long nipple, to hold head firmly in place.
- 7. Fill pump bcdy with oil through oil fill plug (as directed in Operations Section) and also oil all linkage, shift block and shift pin. When hose connections are made, and pump handle is screwed into pump handle socket, the pump is then ready for use.

#### **DISASSEMBLY OF THE 100 TON CYLINDER**

#### GENERAL PROCEDURE

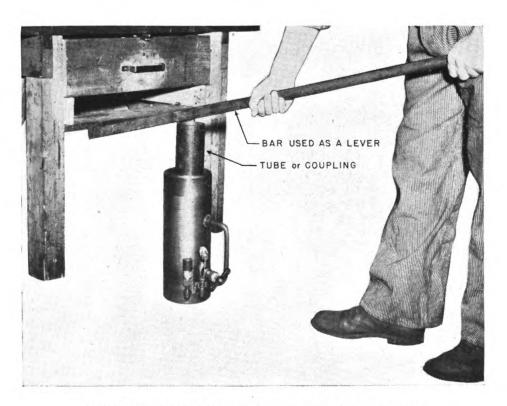
1. Stand the cylinder on end and unscrew the service tool head from the cylinder by turning the head to the left (Figure 24).



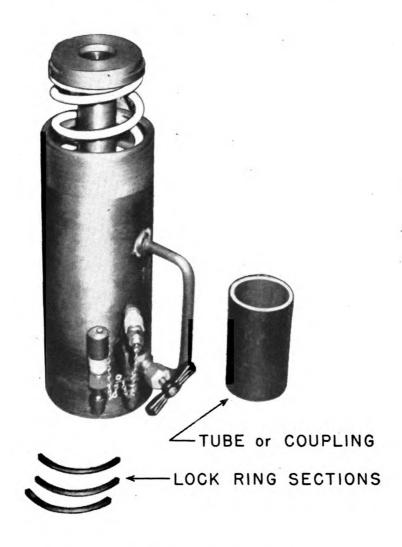
#### UNSCREWING SERVICE TOOL HEAD Figure 24

- 2. After the head has been removed, place a piece of steel tubing or pipe coupling about (21/2" ID x 5" or 6" long) over the end of the ram and against the plate of the cylinder. Then with a bar slipped under a bench or rigid brace, pry down against the tube or coupling, depressing the end plate far enough to remove the three lock ring sections (Figure 25).
- 3. When the lock ring sections have been removed and pressure on the bar is released, the springs in the cylinder will force the end plate out over the end of the ram (Figure 26).
- 4. Now remove the end plate, the two springs and spring separator from the cylinder and the ram assembly may then be pulled out.





DEPRESSING END PLATE OF CYLINDER
Figure 25



LOCK RING SECTIONS REMOVED
Figure 26

### REASSEMBLY OF THE 100 TON CYLINDER

Before reassemblying the cylinder, be some that any defective parts of the ram and piston, such as springs or piston leather are replaced with new parts. Then clean the inside of the cylinder with solvent dry cleaning, and also clean the piston and ram assembly.

Oil the ram leather and rub a thin coat of oil (SAE 10 motor oil) on the inside of the cylinder wall before inserting the piston into the cylinder. Be careful not to crimp the edge of the piston leather when inserting. Now slide the small spring, the spring separator and the large spring over the ram. Place the end plate against the large spring and over the end of ram and force down by leverage as shown in the previous disassembly instructions. Force the end plate down just far enough to insert the three lock rings.

When the leverage is released the end plate will lock in place. Coat the threads of the service tool head with a thin film of white lead and then screw onto the cylinder. Keep the service tool head on the cylinder at all times unless it must be removed if the cylinder is to be used as a jack or for some unusual purpose.





#### INSTRUCTIONS FOR USE OF PARTS SECTION

Parts shown on Parts List Illustrations are arranged in such a manner that each piece is in line with or adjacent to the part to which it is fitted, to facilitate parts identification of the complete assembly and also to assist the actual mechanical assembly of the equipment.

The Parts List Illustrations are shown in major assemblies such as Pump, Cylinder, Frame, etc., following in sequence the order in which the equipment would ordinarily be put together. The Tools are shown and listed in the order of the tools necessary for the working of definite size or number of tracks.

Common Supplies—such items as nuts, washers, pipe fittings, etc., that conform to American Standards appear on several different pages, these common supply items are listed by part number, name, size and price. A list of manufacturers or suppliers of these common items are shown at end of the parts list.

#### **WARNING**

SPARE PARTS can be supplied promptly and accurately only if positively identified by correct part number and correct part name. FURNISH THIS INFORMATION ON ALL REQUISITIONS. WITHOUT FAIL, on all requisitions, give name of machine, name of manufacturer, model or size, manufacturer's serial number of each machine and subassemblies attached to machine, and components and accessories for which spare parts are required.

List spare parts for only one make or kind of machine on each requisition. Requisitions must be double spaced to provide room for office notations when necessary.

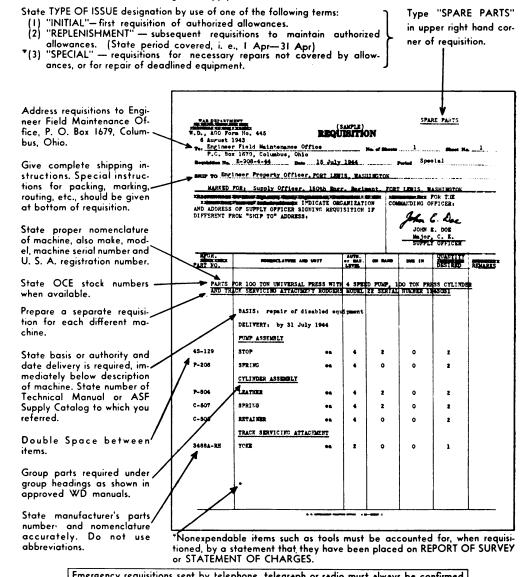


THIS IS WD AGO FORM NO. 445, AS DEVISED BY ALTERING QMC FORM NO. 400 UNTIL SUCH TIME AS NEW PRINTED FORMS NO. 445 ARE AVAILABLE. THIS FORM IS TO BE USED BY POST, CAMP, STATION AND OVERSEAS THEATER DEPOT ENGINEER PROPERTY OFFICERS TO REQUISITION ENGINEER SPARE PARTS FROM THE ENGINEER FIELD MAINTENANCE OFFICE, P. O. BOX 1679, COLUMBUS, OHIO.

The marginal notes give instructions for preparing a requisition for spare parts for Engineer Equipment.

The revised WD AGO Form No. 445 has new column headings as shown below. Under revised heading "Nomenclature and Unit" list the article and the unit (ea for each; lb for Pound; etc.) Under heading "Maximum or Authorized Level" list the authorized organizational allowances or depot stock levels given in ENG 7 and ENG 8 of the ASF Engineer Supply Cata-

log (Superseding Part III, Corps of Engineers Supply Catalog). The total number on hand for each item is listed under "On Hand." In column headed "Due In" enter the total quantity previously requisitioned but not delivered. Column headed "Required" is to be changed to read "Quantity Desired" and column headed "Approved" is to read "Remarks." For "Initial" and "Replenishment" requisitions, the sum of "Quantity Desired," "Due In," and "On Hand" should equal "Maximum or Authorized Level."



Emergency requisitions sent by telephone, telegraph or radio must always be confirmed immediately with requisition marked: "Confirming (state identifying data)."



<sup>\*</sup>Engineer Supply Officers within the Continental United States will use only this period designation.

THIS IS WD AGO FORM NO. 446, AS DEVISED BY ALTERING QMC FORM NO. 400, UNTIL SUCH TIME AS NEW PRINTED FORMS NO. 446 ARE AVAILABLE. THIS FORM IS TO BE USED BY USING ORGANIZATIONS TO REQUISITION ENGINEER SPARE PARTS FROM POSTS, CAMPS OR STATIONS IN THE CONTINENTAL UNITED STATES OR FROM OVERSEAS THEATER DEPOTS.

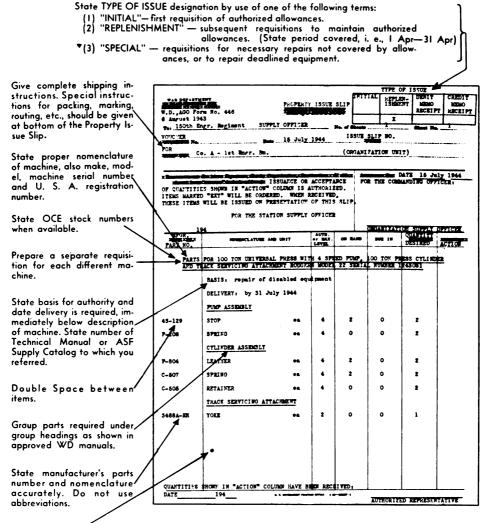
The marginal notes give instructions for preparing the Property Issue Slip for spare parts for Engineer equipment.

Until new WD AGO Forms 446 are available, use the revised form and type or write in corrections and revisions as shown below.

Under revised heading "Nomenclature and Unit"

Under revised heading "Nomenclature and Unit" list the article and the unit (ea for each; lb for pound; etc.). Under heading "Maximum or Authorized Level" list the authorized organizational allowances or depot stock levels given in ENG 7 and ENG 8 of

the ASF Engineer Supply Catalog (Superseding Part III, Corps of Engineers Supply Catalog). The total number on hand for each item is listed under "On Hand." In column headed "Due In" enter the total quantity previously requisitioned but not delivered. Column headed "Required" is to be changed to read "Quantity Desired" and column headed "Approved" is to read "Action." On "Initial" and "to Repair Deadlined Equipment" Property Issue Slips, the sum of "Quantity Desired," "Due In," and "On Hand" should equal "Maximum or Authorized Level."



\*Nonexpendable items such as tools must be accounted for, when requisitioned, by a statement that they have been placed on REPORT OF SURVEY or STATEMENT OF CHARGES.

Supply officers of posts, camps and stations who receive Property Issue Slips from using organizations will transfer information on above form to WD AGO Form No. 445, "Requisition" and forward to Area or Theater Depot if overseas; if within the continental United States and no local source of supply from which procurement can be made is available, forward

requisitions to the Engineer Field Maintenance Office, P. O. Box 1679, Columbus, Ohio. For further information on preparation of Property Issue Slips and Requisitions, see Army Service Forces Manual M-403, "Station Supply Procedure;" WD Circular No. 170, "Simplified Property Accounting Procedure," 24 July 1943, as amended by WD Circular No. 39, 29 January 1944.

<sup>▼</sup>In Continental United States, using organizations will use only this period designation. (Substitute "SPECIA'" for "REPLENISHMENT" in head of form.)



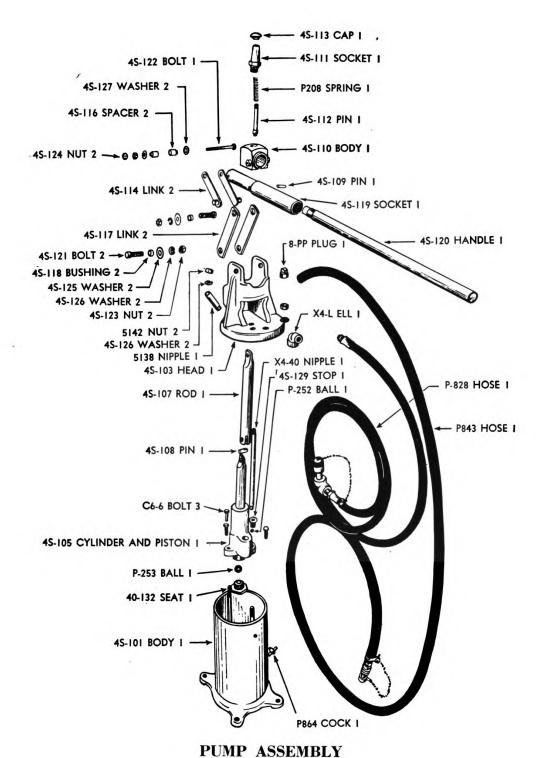
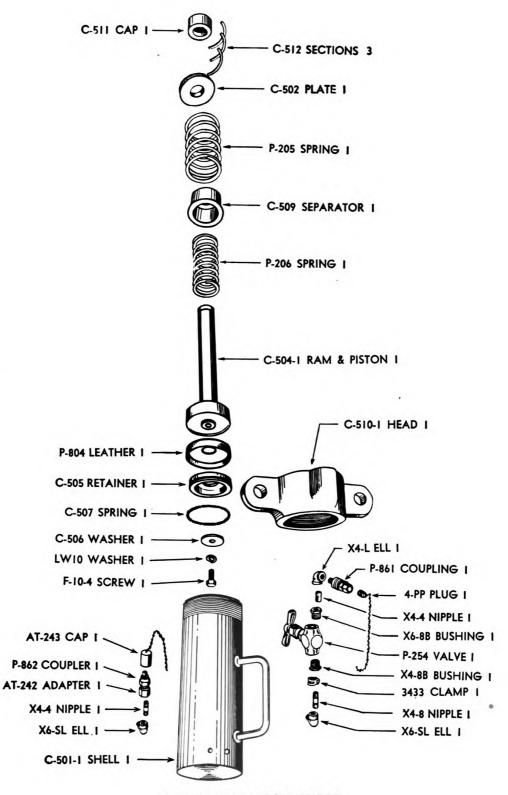


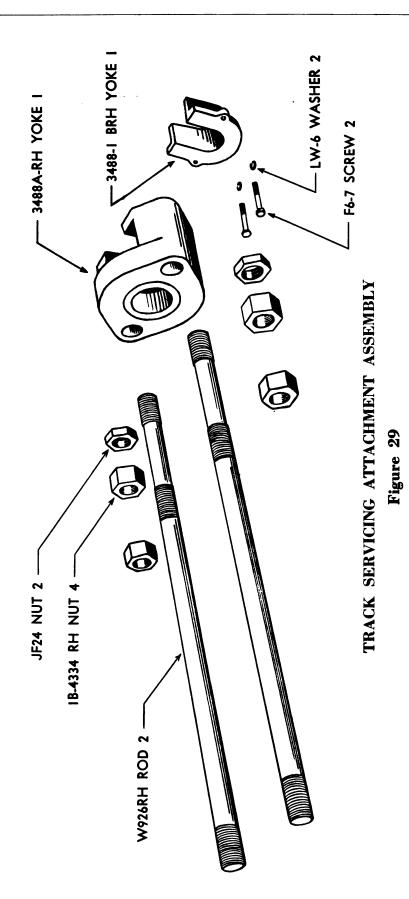
Figure 27

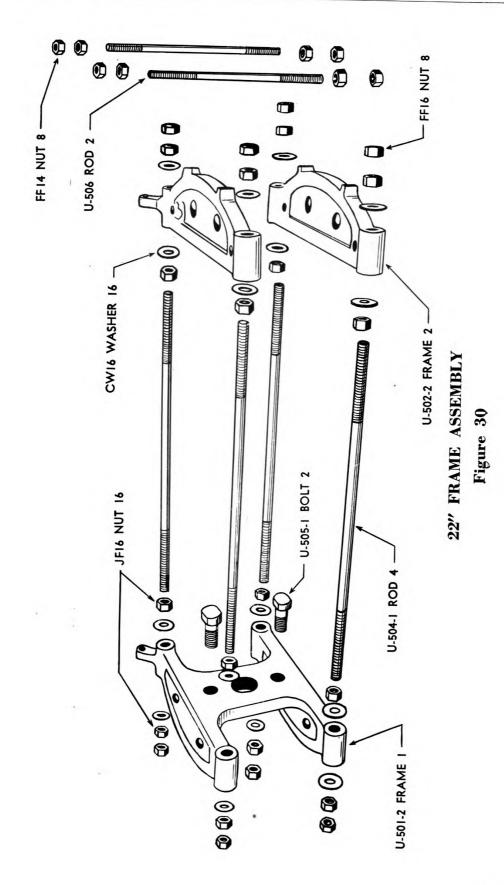


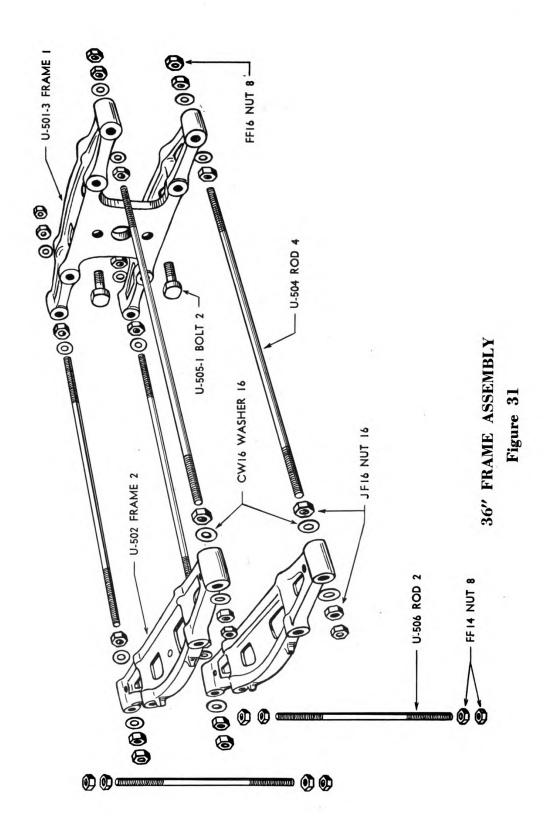
CYLINDER ASSEMBLY

Figure 28









#### **PUMP**

PART NO.	DESCRIPTION	PAGE LOCATION	NO. REQ'D	WEI LBS.	GHT OZS.	PRICE EACH
 X4-L	Ell (90°) 1/4"	37	1		6	\$ .41
C6-6	Bolt		3		1	.03
8-PP	Plug (Pipe) 1/2"	37	1		2	.02
X4-40	Nipple	37	1		8	.26
4S-101	Body (Pump)	37	1	27	13	16.50
4S-103	Head (Pump)		ī	15	8	6.23
4S-105	Cylinder and Piston		î	9	8	12.60
4S-107	Rod (Connecting)		1	2	10	4.39
4S-108	Pin (Connecting Ro		1		2	.23
4S-109	Pin (Upper Wrist)		1		11/4	.23
4S-110	Body (Shift)		1	1	12	8.63
4S-111	Socket (Shift Hand		1	_	4	.23
4S-111			1		2	.23
4S-112	Pin (Shift Handle)		1		2	
	Cap (Shift Pin)	3 /	1		Z	.15
4S-114	Link (With Pin)	2 17	2		4	<b>6</b> 0
40 116	(Horizontal)		2		4	.68
4S-116	Spacer		2		1	.38
4S-117	Link (Vertical)		2		11	.38
4S-118	Bushing	37	2		1/2	.34
4S-119	Socket (Handle)	37	1	3	13	6.08
4S-120	Handle		1	3	$8\frac{1}{2}$	3.00
4S-121	Bolt	• •	2		2	.06
4S-122	Bolt		1		2	.06
4S-123	Nut (Full) NF		2	•	1	.04
4S-124	Nut (Full) NF		2		1/2	.02
4S-125	Washer (Cut)		2		1/2	.02
4S-126	Washer (Lock)		4		1/4	.02
4S-127	Washer (Cut)	37	2	•	1/4	.02
4S-129	Stop (Ball Stop)	37	1		6	.56
40-132	Seat (Ball)	37	1		6	1.88
P208	Spring	37	1		1	.15
P-252	Ball (Steel) 5/8"	37	1		1	.07
P-253	Ball (Steel Intake)	<b>7/8''</b> 37	1	••••	2	.12
P-828	Hose (Oil Return) 1		1	2	11	3.56
P-843	Hose (High Pressure				-	2 0
	Fitting) 10'		1	4	$41/_{2}$	8.25
P-864	Cock (Drain)		1		1	.23
5138	Nipple (Blind)		i		2	.19
5142	Nut (Full) NF		2	••••	1	.04



#### **CYLINDER**

PART		PAGE	NO.	WEI	GHT	PRICE
NO.	DESCRIPTION	LOCATION	REQ'D	LBS.	ozs.	EACH
4-PP	Plug 1/4"	38	1		1	\$ .02
X4-L	Ell (90°)	38	1	•	6	.41
X4-4	Nipple		2		1	.08
X4-8	Nipple		1		2	.11
X4-8B	Bushing	38	1		2	.34
X6-SL	St. Ell 3/8"	38	1		7	.64
X6-L	Ell 3/8"	38	1		10	.41
X6-8B	Bushing		1	•	2	.34
LW10	Washer (Lock) 5/8"		1		1/4	.01
F-10-4	Screw (Cap) 5/8"		1		4	.07
P-205	Spring (Large)		1	2	14	.83
P-206	Spring (Small)		1	1	14	.56
AT-242	Adapter		1		4	.94
AT-243	Cap		1		4	1.31
P-254	Valve (Globe)	38	1	1	12	4.43
C501-1	Shell (Cylinder)		1	48	4	37.50
C-502	Plate (Front End)		1	4	1	6.08
C-504-1	Ram and Piston		1	22	12	22.50
C-505	Retainer (Leather)	38	1	2	2	4.20
C-506	Washer (Retainer)		1		7	.64
C-507	Spring (Coil)		1		2	.75
C-509	Separator (Spring)		1	3	10	2.63
C-510-1	Head (Cat.)		1	53	8	33.75
C-511	Cap (Ram)		1	2	2.0	3.00
C-512	Sections (Lock Ring		3		1	.19
P-804	Leather (Cup)		1		4	2.06
P-861	Coupling		1		2	2.21
P-862	Coupler		1		8	5.44
3433	Clamp (Hose)		1		1	.08
	1 \					

#### **PARTS SECTION**

#### TRACK SERVICING ATTACHMENT

LW-6	Washer (Lock) 3/8"	39	2		1/4	\$ .01
<b>F</b> 6-7	Screw (Cap) 3/8"x13/4"	39	2		$1\frac{1}{2}$	.03
JF24	Nut (Jam) NF 1½"	39	2		9	.36
W926RH	Rod (Tension)	39	2	11	3	6.38
3488-1BRH	Yoke (Adapter)	39	1	3	14	3.00
3488 <b>A-RH</b>	Yoke	39	1	41	8	20.63
1B-4334RH	Nut (Full) NF 11/2"	39	4	1	2	.36

#### 22" FRAME

PART NO.	DESCRIPTION	PAGE LOCATION	NO. REQ'D	WEI	GHT OZS.	PRICE
				******		
FF14 CW16	Nut (Full) NF 1/8" Washer (Cut) 1"		8 16		3	\$ .06
				•	3	.04
FF16	Nut (Full) NF 1"		8	•-••	6	.09
JF16	Nut (Full) NF 1"		16	112	4	.09
U-501-2	Frame (Upper)		1	113	8	36.60
U-502-2	Frame (Lower)		2	41		15.7
U-504-1	Rod (Tension)		4	7	8	3.0
U-505-1	Bolt		2	3		3.3
U-506	Rod (Tie)	40	2	2	8	1.0
	PARTS	SECTI	ON			
	36"	FRAME				
U-502	Frame (Lower)	41	2	65		\$23.6
U-501-3	Frame (Upper)		1	160		67.5
U-504	Rod (Tension)		4	10	4	3.7
U-505-1	Bolt		2	3		3.3
U-506	Rod (Tie)		2	2	8	1.0
FF14	Nut (Full) NF	41	8		3	.0
CW16	Washer (Cut)		16		3	.0 .0
FF16	Nut (Full) NF	41	8		6	.0 .0
JF16	Nut (Jam) NF		16		4	.0 .0
	PARTS TRACK TOOLS	_		ra de		
105-1	Pin Adapter & Bush		AMI (	LAPS		
10)-1		• 16	1	4	. 2	\$ 5.2
111-1	Pin Adapter & Bush		1	7	-	Ψ ).2
111,1	Adapter		1	5	9	5.8
113-1			1	,	. 9	).0
115-1	Pin Adapter & Bush		1	77	2	6 2
205 1	Adapter		1	7	3	6.3
305-1	Assembly Collar		1	1	8	2.0
313-1	Assembly Collar		1	2	8	4.1
403-1	Pin Pusher & Pilot P		1	2	12	1.8
406-1	Pin Pusher & Pilot P	in 17	1	7	6	3.0
603-1	Bushing Pusher &		_	-	_	
	Assembly Pin	16	1	5	8	4.4
606-1	Bushing Pusher &		_		_	
	Assembly Pin		1	14	2	5.8
1101	Short Flat Ram Cap		1	1	12	1.9
1102	Short Recessed Ram		1	1	9	1.9
1103	Long Flat Ram Cap		1	5	4	2.4
1105	Ram Cap Adapter (1	Long) 16	1	5	2	2.7
1105-1	Ram Cap Adapter					
	(Extra Long)	16	1	6	10	2.8



Original from 43

# ACCESSORY LIST PUMP

RODGERS PART NO.	DESCRIPTION	MANUFACTURER	MFG. ADDRESS	MFG, PART OR MODEL NO.
X4·L	EII (90°)	Grinnell Co.	Providence, R. I.	1,4,"
C6.6	Bolt	Phoell Mfg. Co.	Chicago, Ill.	3/8" x 11/2" USS
8.PP	Plug (Pipe)	Grinnell Co.	Providence, R. I.	1/2"
P-252	Ball (Steel)	SKF Industries, Inc.	Philadelphia, Pa.	54001
P-253	Ball (Steel)	SKF Industries, Inc.	Philadelphia, Pa.	55601
P.828	Hose (Oil Return)	Goodrich Tire & Rubber Co.	Akron, Ohio	1/2" 2 Braid
P.843	Hose (High Pressure)	Anchor Coupling Co.	Libertyville, Ill.	4C.4M8
P.864	Cock (Drain)	The Weatherhead Co.	Cleveland, Ohio	135
	TR	TRACK SERVICING ATTACHMENT	IMENT	
LW-6	Washer (Lock)	Phoell Mfg. Co.	Chicago, Ill.	3/8"
F6-7	Screw (Cap)	Phoell Mfg. Co.	Chicago, Ill.	3/8" x 13/4"
JF-24	Nut (Jam NF)	Phoell Mfg. Co.	Chicago, Ill.	11/2"
1B-4334 RH	Nut (Full NF)	Phoell Mfg. Co.	Chicago, Ill.	11/2"
		FRAME		
FF.14	Nut (Full NF)	Phoell Mfg. Co.	Chicago, Ill.	1/8"
CW-16	Washer (Cut)	Phoell Mfg. Co.	Chicago, Ill.	1,,
FF-16	Nut (Full NF)	Phoell Mfg. Co.	Chicago, III.	.1"
JF-16	Nut (Jam NF)	Phoell Mfg. Co.	Chicago, III.	1,,

# ACCESSORY LIST -- (Continued)

## CYLINDER

RODGERS PART NO.	DESCRIPTION	MANUFACTURER	MFG. ADDRESS	MFG. PART OR MODEL NO.
4.PP	Plug	Grinnell Co.	Providence, R. I.	1/4"
X4·L	EII (90°)	Grinnell Co.	Providence, R. I.	1/4 X.Heavy
X4.4	Nipple	Grinnell Co.	Providence, R. I.	1/4" x 1" X.Heavy
X6	St. Ell	Grinnell Co.	Providence, R. I.	3/8"
X6-SL	EII	Grinnell Co.	Providence, R. I.	3/8"
X6.8B	Bushing	Grinnell Co.	Providence, R. I.	3/8"—1/2" X-Heavy
X4.8	Nipple	Grinnell Co.	Providence, R. I.	$1/2'' \times 2'' \text{ X-Heavy}$
X4.8B	Bushing	Grinnell Co.	Providence, R. I.	1/4"-1/2" X-Heavy
LW-10	Washer (Lock)	Phoell Mfg. Co.	Chicago, Ill.	2/8"
F-10-4	Screw (Cap)	Phoell Mfg. Co.	Chicago, Ill.	3/8" x 11/4"
P.254	Valve (Globe)	Crane Co.	Chicago, Ill.	222 H—1/2"
P.861	Coupling	Hanson Mfg. Co.	Cleveland, Ohio	1000-10
P.862	Coupler	Blackhawk Hydraulic Eq. Co. Milwaukee, Wis.	Milwaukee, Wis.	Z-400
3433	Clamp (Hose)	S. & M. Auto Supply Co.	Minneapolis, Minn. 3/8"	3/8"